

What is claimed is:

1. A fuel vapor management apparatus for an internal combustion engine, comprising:  
a housing, the housing defining an interior chamber and a valve separating the interior chamber into first and second portions; and  
a device including a temperature sensor disposed within the chamber, the device being configured to detect fuel vapor flow based upon a temperature detected by the sensor.
2. The apparatus of claim 1, wherein the device detects fuel vapor flow based upon a detected change in temperature.
3. The apparatus of claim 2, wherein the device includes a thermistor.
4. The apparatus of claim 3, wherein the device includes a resistor thermally coupled with the thermistor.
5. The apparatus of claim 1, wherein the valve is actuated by forces originating from a change in pressure between the first and second portions.
6. The apparatus of claim 1, wherein the valve is a pressure operable valve.
7. The apparatus of claim 1, wherein the sensor resides on a circuit board and the circuit board includes a pressure sensor.
8. The apparatus of claim 7, wherein the circuit board is disposed in the first portion and the first portion includes a coupling end for securing it directly to a canister.
9. The apparatus of claim 1, wherein the device calculates a flow rate.

10. The apparatus of claim 1, wherein the device has a first and second configuration, the first configuration including an enabled heating element and the second configuration including a disabled heating element.

11. The apparatus of claim 1, further including :

a pressure operable device comprising the valve;

the sensor is disposed in the first portion; and

the first portion is in continuous fluid communication with a fuel vapor collection canister and the second portion is isolated from the canister by the valve.

12. The apparatus of claim 11, wherein the pressure operable device further includes:

a poppet movable along an axis and a seal adapted to cooperatively engage the poppet, wherein a first arrangement of the pressure operable device occurs when there is a first negative pressure level in the fuel vapor collection canister relative to the vent port and the seal is in a first deformed configuration, a second arrangement of the pressure operable device permits a first fluid flow from the vent port to the fuel vapor collection canister when the seal is in a second deformed configuration, and a third arrangement of the pressure operable device permits a second fluid flow from the fuel vapor collection canister to the vent port when the seal is in an un-deformed configuration, and wherein the pressure sensor signals the first arrangement of the pressure operable device.

13. The apparatus of claim 12, wherein the poppet is configured to move along an axis between a first position, a second position, and an intermediate position between the first and second positions.

14. The apparatus of claim 13, wherein the first and second arrangements of the pressure operable device comprise the poppet in the second position, and the third arrangement of the pressure operable device comprise the poppet in the first position.

15. The method of claim 14, wherein a spring biases the poppet towards the second position.

16. A fuel vapor management apparatus for an internal combustion engine, comprising :  
a housing, the housing defining an interior chamber and a valve separating the interior chamber into first and second portions; and  
means for measuring fluid flow disposed within the interior chamber.
17. The apparatus of claim 16, wherein each of the first and second portions include one and only one fluid port.
18. The apparatus of claim 16, wherein the means for measuring fluid flow includes a control circuit including a leak detection means.
19. The apparatus of claim 18, wherein the leak detection means comprises a pressure sensor.
20. The apparatus of claim 18, wherein the means for measuring fluid flow through the housing includes a temperature sensor.
21. The apparatus of claim 20, wherein the leak detection means includes the temperature sensor.
22. The apparatus of claim 18, wherein the leak detection means comprises the means for measuring fluid flow through the housing.
23. The apparatus of claim 22, wherein the means for measuring fluid flow through the housing includes a thermistor adapted for being heated by a voltage applied across the thermistor.
24. The apparatus of claim 16, wherein the means for measuring fluid flow through the housing includes a thermistor and heating resistor.

25. A fuel vapor pressure and flow apparatus of a fuel system supplying fuel to an internal combustion engine, comprising:

a housing defining an interior chamber;

a valve separating the interior chamber into first and second portions;

a pressure sensor located within the interior chamber; and

a flow sensor located within the interior chamber, the flow sensor including a

thermistor.

26. The apparatus of claim 25, wherein the flow sensor includes heating element.

27. The apparatus of claim 26, wherein the heating element is a resistor.

28. The apparatus of claim 27, wherein the thermistor and resistor are thermally bonded using one of epoxy and placing the thermistor on the resistor.

29. The apparatus of claim 27, wherein the resistor is one of conductive ink and a resistive gold leaf.

30. The apparatus of claim 25, wherein the thermistor and heating element are located in the first portion.

31. The apparatus of claim 25, further including :

a pressure operable device comprising the valve;

the flow sensor is disposed in the first portion; and

the first portion is in continuous fluid communication with a fuel vapor collection canister and the second portion is in continuous fluid communication with a vent port.

32. The apparatus of claim 31, wherein the pressure operable device further includes:

a poppet movable along an axis and a seal adapted to cooperatively engage the poppet, wherein a first arrangement of the pressure operable device occurs when there is a first negative pressure level in the fuel vapor collection canister relative to the vent port and the

seal is in a first deformed configuration, a second arrangement of the pressure operable device permits a first fluid flow from the vent port to the fuel vapor collection canister when the seal is in a second deformed configuration, and a third arrangement of the pressure operable device permits a second fluid flow from the fuel vapor collection canister to the vent port when the seal is in an un-deformed configuration, and wherein the pressure sensor signals the first arrangement of the pressure operable device.

33. A method for diagnosing a purge valve of a fuel vapor pressure management system of an internal combustion engine, comprising the steps of :

heating a temperature sensor; and

detecting fuel vapor flow using the temperature sensor and determining, based on the detected fuel vapor flow, whether the purge valve is purging fuel vapor.

34. The method of claim 33, wherein the detecting fuel vapor flow further includes detecting a rate of change in temperature using the temperature sensor.

35. The method of claim 33, further comprising the step of opening the purge valve, wherein the heating step occurs before the opening of the purge valve.

36. The method of claim 35, further comprising the step of opening the purge valve, wherein the heating step occurs after the opening of the purge valve.

37. The method of claim 33, further including the step of measuring an initial plurality of temperatures of the sensor before detecting a fuel vapor flow.

38. The method of claim 33, further including the step of measuring a plurality of temperatures using the sensor wherein the initial measured temperature is greater than the final measured temperature.

39. The method claim 33, further including the step of measuring a plurality of temperatures using the sensor wherein the initial measured temperature is less than the final measured temperature.
40. The method of claim 33, further including the steps of :  
opening the purge valve, and  
synchronizing the opening of the purge valve step with the heating step.
41. The method of claim 33, further including the step of:  
providing a housing defining an interior chamber, the chamber containing a valve separating the chamber into a first portion and second portion; and  
positioning the temperature sensor in one of the first and second portions.
42. The method of claim 41, further including the steps of :  
using a pressure operable device comprising the valve;  
locating the temperature sensor in the first portion; and  
providing the first portion in continuous fluid communication with a fuel vapor collection canister and the second portion in continuous fluid communication with a vent port.
43. The method of claim 42, wherein the providing step further includes :  
providing a poppet movable along an axis and a seal adapted to cooperatively engage the poppet as the pressure operable device, wherein a first arrangement of the pressure operable device occurs when there is a first negative pressure level in the fuel vapor collection canister relative to the vent port and the seal is in a first deformed configuration, a second arrangement of the pressure operable device permits a first fluid flow from the vent port to the fuel vapor collection canister when the seal is in a second deformed configuration, and a third arrangement of the pressure operable device permits a second fluid flow from the fuel vapor collection canister to the vent port when the seal is in an un-deformed configuration, and the pressure sensor signals the first arrangement of the pressure operable device.

44. The method of claim 43, further including the step of orientating the poppet so that it is movable along an axis between a first position, a second position, and an intermediate position between the first and second positions.

45. The method of claim 44, wherein the first and second arrangements of the pressure operable device comprise the poppet in the second position, and the third arrangement of the pressure operable device comprises the poppet in the first position.

46. The method of claim 45, wherein a spring biases the poppet towards the second position.